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Pararhyacodrilus gen. n. (Oligochaeta, Tubificidae)

L.N. Snimshchikova

This paper descibes Pararhyacodrilus gen. n. and P. aspersus sp. n. from northern [Lake] Baikal. The new genus also includes two European species transferred from the genus Rhyacodrilus: P. ekmani (Piguet) and P. palustris (Ditlevsen). These three species are characterized by communication of the spermathecae with the intestine and the absence of intermediate denticles in the dorsal setae arranged in tufts together with capillary [setae]. A key to species of the genus Pararhyacodrilus is included.

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Among the oligochaetes from benthos collections by an expedition of the Limnological Institute in the shallow-water area of northern Lake Baikal in 1975-1976 investigators found an unknown member of the family Tubificidae. Its description and differential diagnosis appear below.

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*Numbers in the right-hand margin indicate the corresponding pages in the original.

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Pararhyacodrilus Snimstchikova gen. n.[1]

Genotype Pararhyacodrilus aspersus sp. n.

Diagnosis. The setae in the ventral tufts are bicuspid, while those in the dorsal tufts are capillary and bicuspid. The dorsal bicuspid setae arranged in tufts together with the capillary [setae] have no intermediate denticles. The setae of the succeeding segments (not containing capillary [setae]), resemble the ventral [setae]. The ventral setae with a longer distal tooth; they are uniformly dentate or with a longer and thicker proximal tooth. The ventral setae of segment XI have been transformed into penial [setae] with 2 reduced denticles, or they are monodont, with several setae in each tuft. Coelomocytes occur in the body cavity. The reproductive organs are located in the segments typical of the family. The vasa deferentia are convoluted and moderately long. The atria are pyriform or rounded. The ampullae of the atria are covered with a layer of prostate cells. The spermathecae with a rounded ampulla communicating with the intestine, and a short efferent part. The semen is not [literally] organized into spermatozeugmas and is amorphous.

Pararhyacodrilus aspersus Snimstschikova, sp. n. /204

(illustration)

Material. Twelve specimens, 8 of them sexually mature, northern [Lake] Baikal, off Cape Kurla (north of the port), depth 2 m,

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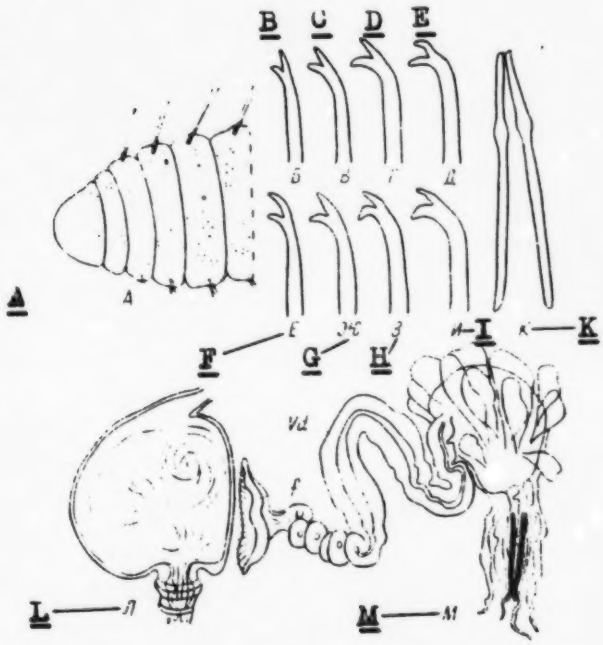
[1] Pararhyacodrilus means "closely resembling Rhyacodrilus."

pebbles overgrown with crusted sponge, and cobbles, 8 August 1976. The holotype is kept in the collection of the Limnological Institute, Academy of Sciences USSR (Irkutsk).

Description. Body length up to 4-6 mm. The diameter in the region of the clitellum is 0.6-0.8 mm. The segments number 36 to 38. The prostomium is wide, with a rounded vertex, and is prolobous. Its length is almost half its width at the base. The intersegmental



Pararhyacodrilus aspersus gen. et sp. n.: *А* — общий вид переднего конца; *Б*—*Д* — спинные щетинки II, VIII, XXX, XXXVII сегментов; *Е*—*И* — брюшные щетинки II, XV, XXX, XXXVII сегментов; *К* — пенальные щетинки; *Л* — семяприемник; *М* — мужской гонодукт; *f* — семенная воронка, *Vd* — семяпровод

Pararhyacodrilus aspersus gen. et sp. n.: A - overall view of anterior ring; B-E - dorsal setae of segments II, VIII, XXX and XXXVII; F-I - ventral setae of segments II, XV, XXX and XXXVII; K - penial setae; L - spermatheca; M - male gonoduct; f - seminal funnel. Vd - vas deferens.

grooves are deep. The segments are convex; beginning with [segments] VII-VIII they are two-ringed, and the anterior ring is wider than the posterior ring. The postclitellar segments are divided into 3 or 4 rings about equal in width. The caudal segments XXVIII-XXXV are three-ringed; the anterior and posterior rings are narrow, and setae occur on the middle, wider, ring.

The body integuments are opaque, and the cuticle is granular. The body wall is 14 μ thick. The body surface is covered with small, granule-like brown spots of congealed secretion from skin glands[2]. There are few of them on the preclitellar segments, only a few granules per segment, while on the clitellar and postclitellar segments they are arranged thickly and evenly, giving the body its characteristic appearance. In their outer appearance the worms resemble Svetlovia maculata Cekanovskaja, in which an investigator has described the same "specks" on the body surface (Chekanovskaya, 1975). In the new species, as in Svetlovia maculata, the spottiness of the integuments results not from pigmentation, but rather from secretions of the epidermal glands. Secretions congealed in separate droplets on the body surface, have been found not only in sexually mature specimens, but also in others that are quite young.

Capillary setae occur only on segments II-VIII at the rate of 1 or 2 in a tuft; they are [literally] unfledged and 170 to 230 μ long. The bicuspid dorsal and ventral setae with an ectal nodule are arranged 3 or 4 in a tuft (or 2 each in the tufts of some caudal segments). The ventral bicuspid setae of the anterior segments are thin and slightly

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[2] Hence the name aspersus (Latin), meaning "mottled".

curved, and 95 to 100 μ long, with a distal tooth twice as long as the proximal tooth; the teeth are almost equally thick. In the succeeding segments the setae are larger (up to 122 μ) and more markedly curved; the relative length of the distal tooth decreases, while the proximal [tooth] becomes thicker and longer. The setae in the tufts of the postclitellar segments have teeth of equal length, the proximal tooth being 1.5 to 2 times thicker than the distal one. The setae on the /205
caudal segments are thick (twice as thick as the setae of the first segments), markedly curved in the shape of an s, and 108 to 112 μ long, with the proximal tooth longer and thicker than the distal one.

The bicuspid dorsal setae of the preclitellar segments (II-VIII) with straight teeth diverging at an acute angle, in contrast to the teeth of the ventral setae of the same segments, curved and diverging almost at a right angle (see illustration, B-F). The dorsal and ventral setae of the postclitellar segments are homotypic. The penial setae occur at the rate of 2 in a tuft; they are 115 μ long, with a well-pronounced ectal nodule and two reduced denticles on their distal end. They are almost straight and arranged at an acute angle to one another (illustration, K). The body cavity contains globular and ellipsoidal coelomocytes 42 to 50 μ in diameter.

The clitellum is ring-shaped and occupies segments X-XII. The spermathecal openings in the anterior half of segment X at the intersegmental groove are on the line of the ventral setae. The atrial apertures open in the middle of segment XI also on the line of the ventral setae. One pair of testes in segment X is at dissepiment 9/10. One pair of ovaries in segment XI is at dissepiment 10/11. The seminal funnels are large and located on dissepiment 10/11 very close to the

spermathecae and almost up against them. The vasa deferentia are thick-walled, loose, about 500 μ long, and convoluted and narrow at the funnels; in their middle part they widen slightly in diameter, form 2 or 3 large loops and discharge into the upper part of the atria (illustration, M). There is one pair of atria in segment XI. The atrium is pyriform, constricted distally, inclined slightly forward, and covered at the top with groups of prostate cells. The efferent part of the atrium is well defined, slightly shorter and much narrower than the atrial ampulla, and terminates in a pseudopenis. The length of the atrium with its efferent part is 250 μ, and its diameter in its proximal part is 120 μ.

There is one pair of spermathecae in segment X. [One] spermatheca with a large, globular ampulla and a short efferent duct standing out sharply from it. The ampulla of the spermatheca communicates in its proximal part with the intestine, forming a diverticulum branching out from it in the form of a wide [literally] rumen constricted towards the place at which it discharges into the intestine wall. In the illustration, the ampulla of the spermatheca L is deformed on one side by the nearby seminal funnel. The length of the ampulla equals its width: 175 μ. The efferent duct is 70 μ long. The semen is not organized into spermatozeugmas and is amorphous.

The new species, together with the two known species of the genus Rhyacodrilus Bretscher (R. palustris Ditlevsen, 1904 from Denmark, and R. ekmani Piguet, 1928 from northern Sweden) form a group of species differing from the other members of the genus in that the spermathecae communicate with the intestine. As Chekanovskaya (1962 and 1972) has noted, this feature does not appear in any other tubificid

genus, but is in the highest degree typical of the family Enchytraeidae. On this basis Chekanovskaya considers the genus Rhyacodrilus to be the "connecting link" between the families Tubificidae and Enchytraeidea.

Within the family Lumbriculidae the species belonging to the genus Rhynchelmis Hoffmeister are also characterized by communication between the spermathecae and the intestine. Until recently this genus included a species having no spermathecae communicating with the intestine: R. olchonensis Burov et Kozov, 1932. Hrabê (Hrabê, 1982) removed it from the genus Rhynchelmis and made it into the new genus Pseudorhynchelmis Hrabê, 1982. Thus the connection of the spermathecae to the intestine in species of the genus Rhynchelmis is now a generic criterion.

Among the species of the tubificid group that we are considering we see a correspondence between a feature such as the communication of the spermathecae with the intestine and another feature - the absence of intermediate denticles in the dorsal setae arranged in tufts together with capillary setae. In other species of /206
the genus Rhyacodrilus fan-shaped setae occur in the dorsal tufts at least in the anterior part of the body, if there are capillary setae, or in the group of species devoid of capillary setae (Sokol'skaya, 1973) the ventral and dorsal setae are of uniform shape.

P. aspersus most closely resembles R. palustris in the structure of its setal apparatus (the similarity lies in the structure of the ventral setae of all segments and of the dorsal setae of the preclitellar segments, and in the distribution of the capillary setae), the shape of its spermatheca, and its body dimensions (see Ditlevsen,

1904). [P. aspersus] differs from [R. palustris] in the structure of the dorsal setae of its postclitellar segments, the structure and number of the penial setae in a tuft, and the shape of the atrium.

P. aspersus displays some features of similarity with R. ekmani in the structure and size of its bicuspid setae and the shape of its spermatheca, but the sequence in the arrangement of the ventral setae in the reverse of what is characteristic of R. ekmani: in the ventral setae of P. aspersus the relative length of the proximal tooth gradually increases, while that of the distal tooth decreases towards the end of the body. In R. ekmani, conversely, on the anterior segments the proximal tooth of the setae is much larger than the distal [tooth], and its size diminishes towards the end of the body. The species differ in the distribution of capillary setae (in R. ekmani capillary setae occur up to segment XIX, and in P. aspersus to VIII), the structure and number of the penial setae in a tuft, the shape of the atrium, and body dimensions.

Rhyacodrilus ekmani profundalis has been described from [Lake] Umbozer on the Kola Peninsula (Lastochkin, 1937). R. ekmani differs from the type subspecies in

a) the sizes of all kinds of setae, which are larger than in ekmani;

b) the shape of its dorsal and ventral setae, with their characteristic widenings of the distal portion: Lastochkin calls these setae "humped";

c) the presence in the dorsal tufts of fan-shaped setae with a membrane between their teeth;

d) the absence of communication between the spermathecae and the intestine.

The differences seem to us to be sufficient to consider the form described by Lastochkin to be an independent species of the genus Rhyacodrilus: R. profundalis Lastočkin.

R. palustris and R. ekmani are clearly differentiated in a set of features from the other species of the genus Rhyacodrilus. We propose to transfer these two European species from the genus Rhyacodrilus to the new genus Pararhyacodrilus, which also includes the new Baikal species P. aspersus.

Michaelsen (Michaelsen, 1935) could not precisely establish a connection between the spermathecae and the intestine in Rhyacodrilus altaianus Michaelsen 1935, described from Lake Sredne-Kochurlinskoe (Central Altai) on the basis of a few macerated or damaged specimens, and only surmised that this connection was possible. Researchers did not find intermediate denticles in the dorsal bicuspid setae, but Michaelsen supposed that they could exist.

R. altaianus was found by Hrabě (Hrabě, 1974) in collections from Lake Teletskoe and redescribed. The species that Hrabě found differs considerably from Michaelsen's description in the structure and number of the ventral setae in a tuft, and the structure of its dorsal bicuspid setae, atria and spermathecae. In Michaelsen's specimens the dorsal bicuspid setae are devoid (?) of intermediate denticles, while in Hrabě's specimens they are fan-shaped, with very long marginal teeth, curved inwards, between which the intermediate denticles are clearly discernible. According to Michaelsen's description, the atria are long and convoluted, form several loops in segment XI and pass into

a short, thin efferent duct; according to Hrabê's description, they are cylindrical. In the specimens that Hrabê investigated the spermathecae have no connection with the intestine. Hrabê attributes the discrepancy in features among the specimens that Michaelsen described and that he [Hrabê] investigated to the inadequacy of Michaelsen's /207 material, but we are left with the impression that two different taxa have been described. This can of course be confirmed only by further research, as Hrabê himself has noted in his study. The question therefore of the generic affiliation of the form described by Michaelsen as R. altaianus, for the time being remains open.

Key to Species of the Genus Pararhyacodrilus

1 (2). Capillary setae occur up to segment XIX. The dorsal bicuspid setae are equally dentate on the anterior segments, and on the postclitellar segments with a proximal tooth much larger than the distal tooth. The ventral setae of the anterior segments with a proximal tooth much longer and thicker than the distal tooth; [the ventral setae] of the postclitellar segments with a longer distal tooth and a short proximal tooth. The penial setae are monodont, with a curved distal end, 4 to 6 in each tuft. The atrium is almost globular .....
..... P. ekmani (Piguet)

2 (1) Capillary setae occur up to segment VIII. The dorsal and ventral setae of the anterior segments with a longer proximal tooth.

3 (4). The dorsal setae of the postclitellar segments with a longer and thicker proximal tooth. The penial setae with 2 reduced denticles; [the penial setae] are straight, 2 in each tuft. The atrium is pyriform ..... P. aspersus sp. n.

4 (3). The dorsal setae of the postclitellar segments with a distal tooth much longer and thicker than the proximal tooth. The penial setae are monodont, and there are several of them in each tuft. The atrium is rounded .....
..... P. palustris (Ditlevsen)

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PARARHYACODRILUS GEN. N. (OLIGOCHAETA, TUBIFICIDAE)

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Summary

Pararhyacodrilus aspersus gen. et sp. n. is described from the northern part of the Lake Baikal. Two European species, *P. ekmani* (Piguet) and *P. palustris* (Ditlevsen), ascribed earlier to the genus *Rhyacodrilus*, have been included in the new genus too. The members of the new genus are characterized by connection between the seminal receptacle and the gut and by absence of the intermediate teeth in the dorsal chaetae situating in bundles together with the capillary chaetae. A key for the species of *Pararhyacodrilus* is given.

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